Emulex® Driver Version 10.4 for FreeBSD

User Manual

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Note: References to OCe11100 series products also apply to OCe11100R series products.

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1. Introduction

This document provides installing, uninstalling, updating, and configuring procedures for an Emulex®-supported FreeBSD network interface card (NIC) driver release.

Supported Versions and Adapters

This manual is applicable to several versions of FreeBSD NIC drivers, operating systems, firmware, and adapters.

For a list of supported FreeBSD operating systems and their associated Emulex firmware and drivers, see the Emulex website for the specific adapter.

The FreeBSD operating system supports the Emulex OneConnect® OCe11102 universal converged network adapter (UCNA), the LightPulse® LPe16202 converged fabric adapter (CFA), and the OneConnect OCe14000-series converged network adapter (CNA). The driver and adapters support:

- Peripheral Component Interconnect Express (PCIe) bus standard (Generation 2 or later)
- Statistics – Ethernet statistics provided for the number of packets received and sent, and errors encountered
- Jumbo packets (greater than 1500 bytes)
- Virtual local area network (VLAN)
- Multicast – packets sent from a source to a group of destinations
- Receive side scaling (RSS) – load balancing on Rx traffic across multiple Rx queues
- TSO/LSO (TCP segmentation offload/large segment offload) – offloads Tx traffic to hardware to improve performance
- CSO (Checksum Offload) to hardware
- Bonding – Ethernet bonding across multiple ports for load balancing and fail-over
- PXE – Preboot eXecution Environment for network boot
- MSI-x – Message signal interrupts–extended
- Promiscuous mode – configuring an Ethernet interface to accept traffic from any destination
- Debugging capability

Abbreviations

AIC	adaptive interrupt coalescing
CFA	converged fabric adapter
CSO	Checksum Offload
LSO	large segment offload
MSI-X	message signaled interrupts-extended
NIC	network interface card (or controller)
PCIe	Peripheral Component Interconnect Express
PXE	Preboot eXecution Environment
RSS	receive side scaling
SFP	small form-factor pluggable
TCP	Transmission Control Protocol
TSO	TCP segmentation offload
UCNA	universal converged network adapter
VLAN	virtual local area network
VPD	vital product data

2. Installing and Uninstalling

This section provides installation and removal instructions for the FreeBSD driver kit.

General Installation Requirements

Prior to driver installation, you must:

- Install a supported adapter in the system. Refer to the adapter's installation manual for specific hardware installation instructions.
- Install the FreeBSD NIC driver on a dual-core (or better) server with Intel x86 or AMD64 architecture and MSI-X support.
- Use a supported operating system. See the Emulex website for a list of supported FreeBSD operating systems.

Installing the FreeBSD Driver Kit

To install the FreeBSD driver kit:

1. Download the appropriate driver kit from the Emulex website.
2. Log on as “root” and type

   ```
   pkg_add oce-<VERSION>-<ARCH>.tbz
   ```

   For example:

   ```
   pkg_add oce-4.1.86.0-amd64.tbz
   ```
3. Type

   ```
   echo 'oce_load="YES"' >> /boot/loader.conf
   ```
4. Extract the tbz driver package and copy the oce.ko file to the /boot/kernel/ directory.
5. Reboot the system.

Uninstalling the FreeBSD Driver Kit

To uninstall the FreeBSD driver kit:

1. Log on as “root” and type

   ```
   pkg_delete oce-<VERSION>-<ARCH>
   ```

   For example:

   ```
   pkg_delete oce-4.1.86.0-amd64
   ```
2. Remove the `'oce_load="YES"'` entry from the /boot/loader.conf file.
3. Reboot the system.

Updating the FreeBSD Driver Kit

To update the FreeBSD driver:

1. Type

   ```
   pkg_update oce-<VERSION>-<ARCH>.tbz
   ```

   For example:

   pkg_update oce-4.1.86.0-amd64.tbz

2. Reboot the system.

Checking the FreeBSD Driver Version

To check the currently installed FreeBSD driver version:

1. Log on as “root”.
2. Type

   ```
   pkg_info | grep -i 'oce driver'
   ```

   For example:

   ```
   pkg_info | grep -i 'oce driver'
   ```

   Output:

   ```
   oce-4.4.130.0       oce driver for freebsd
   ```

Loading and Unloading the Driver

To load the kernel module, type

```
kldload oce.ko
```

To unload the kernel module, type

```
kldunload oce.ko
```

To verify that the driver loaded properly, type

```
kldstat | grep oce
```

3. Configuration

This section provides information on configuring the FreeBSD NIC driver, updating the firmware, and extracting an SFP module's VPD information.

NIC Driver Configuration

This section lists the kernel module parameters and how to configure the FreeBSD NIC driver.

Kernel Module Parameters

Table 3-1 Kernel Module Parameters

Parameter	Description
max_rsp_handled	Default: 64 Allowed values: 1–1024 kenv name: hw.oce.max_rsp_handled sysctl name: dev.oceX.max_rsp_handled max_rsp_handled indicates the maximum number of received frames that are processed during a single receive frame interrupt.

Configuring TSO

TSO can be configured globally (affects all controllers in the system) or individually for Emulex adapters.

To enable TSO globally, type

```
sysctl net.inet.tcp.tso=1
```

To disable TSO globally, type

```
sysctl net.inet.tcp.tso=0
```

To enable TSO for NIC interfaces only, type

```
ifconfig oce<if_id> tso
```

To disable TSO for NIC interfaces only, type

```
ifconfig oce<if_id> -tso
```

Note: <if_id> is the interface identification number.

Configuring LSO

To enable LSO, type

```
ifconfig oce<if_id> lso
```

To disable LSO, type

```
ifconfig oce<if_id> -lso
```

Note: <if_id> is the interface identification number.

Configuring Jumbo Frame Transmit

To enable Jumbo frames transmission, type

```
ifconfig oce<if_id> mtu <mtu>
```

Note: <if_id> is the interface identification number and `<mtu>` should be less than or equal to 9000.

Configuring Adaptive Interrupt Coalescing (AIC)

Note: AIC configuration is available on OneConnect OCe11102 and OCe14000-series adapters only.

To enable AIC, type

```
sysctl dev.oce.<if_id>.aic_enable = 1
```

To disable AIC, type

```
sysctl dev.oce.<if_id>.aic_enable = 0
```

Viewing Device Driver Statistics

To view device driver statistics, type

```
sysctl -a | grep oce
```

To view statistics for a single interface, type

```
sysctl dev.oce.<if_id>
```

Note: `if_id` can be any of the interface values that correspond to the Emulex interfaces in the ifconfig output.

Updating the Firmware

To update the firmware:

1. Copy the code below to the makefile.

   ```
   KMOD=elxflash
   FIRMWS=imagename.ufi:elxflash
   .include <bsd.kmod.mk>
   ```

2. Replace “imagename” in the copied code with the actual firmware file name. The format is <filename>.ufi.
3. Copy this makefile and the firmware file to a temporary directory.
4. Run a “make” command in the directory. This generates an elxflash.ko file.
5. Copy the elxflash.ko file to /boot/modules.

6. Run the command:

   ```
   sysctl dev.oce.<if_id>.fw_upgrade=elxflash
   ```

   Note: <if_id> can be any of the interface values that correspond to the Emulex interfaces in the ifconfig output. If multiple Emulex NIC adapters exist in the same system, the firmware download procedure must be repeated on one <if_id> for each adapter.

7. Check if the sysctl command execution for the firmware update was successful.

   If it was successful, reboot the system. Otherwise, you should see one of the following errors codes:

   - "Invalid BE3 firmware image"
   - "Invalid Cookie. Firmware image corrupted?"
   - "cmd to write to flash rom failed."

   If one of the messages above appears, verify that you have the latest firmware update by checking the Emulex website and then attempt to update the firmware again. If you continue to have issues, contact your Emulex Technical Support representative.

Extracting an SFP Module's VPD Information

To dump an SFP module's VPD:

1. Trigger the dump by typing

   ```
   sysctl dev.oce.<if_id>.sfp_vpd_dump=0
   ```

2. Choose one of the following dump options:

   - For a hexadecimal dump, type

     ```
     sysctl -x dev.oce.<if_id>.sfp_vpd_dump_buffer
     ```

   - For a binary dump, type

     ```
     sysctl -b dev.oce.<if_id>.sfp_vpd_dump_buffer > <filename>
     ```

     where `filename` is the file into which the output should be redirected.

     For example:

     ```
     sysctl -b dev.oce.<if_id>.sfp_vpd_dump_buffer > sfp.bin
     ```